

Ch. 7: The T-Test

- This chapter, we are looking to make conclusions about the unknown parameter

μ (like Ch. 6!)

- Since we don't know μ , then we don't know σ either. Why?

μ is in formula for σ

- σ is estimated by S (sample std. dev.)

- So in our test of significance, wherever we see σ , we now use s

- Once we do this estimation, we can't use z-distrib - Why?

based on $N(\mu, \sigma)$

z-scores

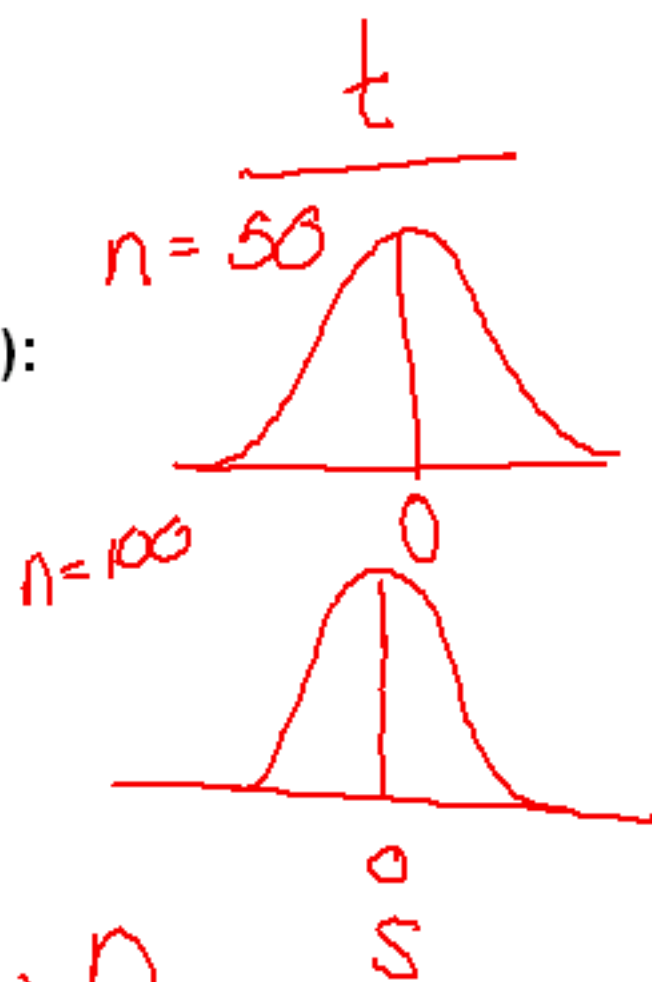
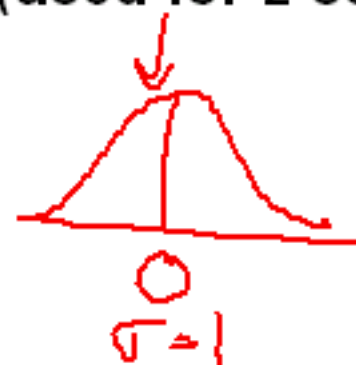
- Instead, we will use what is called the t-distribution.

t-scores

The T-distribution:

- There is ...
a different t -distribution
for every sample size.
- Similarities to Standard Normal Curve (used for z scores):

- center @ 0
- shape



- Big difference from Standard Normal Curve
 - spread changes, based on S , n
 - Why? S changing due to n

$\sigma =$
 S -changes

- How does the sample size affect the t-distribution?

* Degrees of freedom = $n - 1$ (in formula $\frac{s}{\sigma}$)

- As the degrees of freedom increase...

(n)

(sample)

t-distribution becomes
closer to z-distrib
(pop.)

$$n = 10$$

$$\mu = 20$$

$$s \rightarrow \sigma$$

$$\bar{X} \rightarrow \mu$$

The One Sample T-Test

Same steps:

1. Assump.
2. Hyp.
3. Test Stat.
4. P-value
5. Concl.

Hypotheses:

- Same as Ch. 6!

$$H_0: \mu =$$
$$H_a: \mu \neq$$

$$\sigma/\sqrt{n}$$

Test Statistic:

- Formula: Generic

$$\frac{\text{statistic} - \text{parameter}}{(\text{std. dev. of stat.})}$$

Specific:

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

P-Value:

- Notation:

$$P(t \geq \text{test stat} \mid df = n-1)$$

- Calculator Use:

$$tcdf(LB, UB, df)$$

Conclusion:

- Same 2 sentences...

One Sample t Confidence Interval

Formula: Generic

$$\text{statistic} \pm \begin{pmatrix} \text{critical} \\ \text{value} \end{pmatrix} \begin{pmatrix} \text{std. dev.} \\ \text{of stat.} \end{pmatrix}$$

Specific:

$$\bar{X} \pm t^* \left(\frac{s}{\sqrt{n}} \right) = (,)$$

- $t^* =$



← based on df

- How do we find t^* ?

Table B on form. sheet

Conclusion:

- Same as with z-interval

T-test T-Interval

Assumptions for t-test and t-interval

STATE:

CHECK

1.

SRS

2.

normal pop
or
 $n \geq 30$

*

Some vocab for this chapter...

Robustness...

7.1

HW:

#1, 2, 5

* assump

* full work